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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/854,269

05/11/2001

Thomas H. DiStefano

TESSERA 3.0-139 DIV

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7590

09/17/2003

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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/854,269

Applicant(s)

DISTEFANO, THOMAS H.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 18 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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### **DETAILED ACTION**

1. This office action is in response to the request for continued examination filed July 31, 2003.

#### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Claim Objections***

3. Claim 4 is objected to because of the following informalities: a) it appears that "at at" is an error (See Claim 4). Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 1-3 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiStefano et al. (U.S. Patent No. 5,455,390) in view of Lakritz et al. (U.S. Patent No. 4,545,610).

In regards to claim 1, DiStefano et al. ("DiStefano") discloses the following:

a) a microelectronic element (94) having a front surface with contact pads (95) thereon (For Example: See Figure 6);

b) a flexible dielectric layer (32) having an exterior surface facing away from said microelectronic element and having terminals (30) exposed at said exterior surface, said terminals being connected to said distal ends (For Example: See Figure 6).

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In regards to claim 1, DiStefano fails to disclose the following:

a) elongated solder columns extending from said front surface of said microelectronic element.

However, Lakritz et al. ("Lakritz") discloses elongated solder columns (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of DiStefano to include elongated solder columns as disclosed in Lakritz because it aids in providing resistance to stress (For Example: See Column 2 Lines 26-55).

Additionally, since DiStefano and Lakritz are both from the same field of endeavor, the purpose disclosed by Lakritz would have been recognized in the pertinent art of DiStefano.

In regards to claim 2, DiStefano discloses the following:

a) a dielectric layer overlies said front surface of said microelectronic element, said dielectric layer having an interior surface facing toward said microelectronic element said dielectric layer having pads connected to said distal ends of and having said terminals thereon connected to said pads (For Example: See Figure 6).

In regards to claim 2, DiStefano fails to disclose the following:

a) solder columns.

However, Lakritz discloses elongated solder columns (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of DiStefano to include elongated solder columns as disclosed in Lakritz because it aids in providing resistance to stress (For Example: See Column 2 Lines 26-55).

Additionally, since DiStefano and Lakritz are both from the same field of endeavor, the purpose disclosed by Lakritz would have been recognized in the pertinent art of DiStefano.

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In regards to claim 3, DiStefano discloses the following:

- a) a compliant layer (80) (For Example: See Figure 6).

In regards to claim 9, DiStefano discloses the following:

- a) terminals overlie said front surface of said chip (For Example: See Figure 6).

6. Claims 4, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakritz et al. (U.S. Patent No. 4,545,610) in view of Tanaka (Japanese Publication No. 02295699).

In regards to claim 4, Lakritz discloses the following:

- a) first and second elements (10 and 20) having confronting surfaces, pads (12 and 21) on said confronting element arranged in pairs, each such pair including a pad on the first element and a pad on the second element (For Example: See Figure 2); and

- b) solder masses at at least some of said pairs, each such solder mass (38) being associated with the pads of one said pair and extending there between (For Example: See Figure 2).

In regards to claim 4, Lakritz discloses the following:

- a) solder masses incorporating columnar inclusions dispersed therein, said columnar inclusions within at least within one of said solder masses being oriented preferentially in the direction between the pads of the associated pair.

However, Tanaka discloses the use of a solder mass that has particles of copper incorporated inside (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Lakritz to include a solder mass that has particles of copper as disclosed in Tanaka because it aids in improving the tensile strength (For Example: See Abstract).

Additionally, since Lakritz and Tanaka are both from the same field of endeavor, the purpose disclosed by Tanaka would have been recognized in the pertinent art of Lakritz.

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In regards to claim 5, Lakritz discloses the following:

a) solder mass is elongated in the direction between the pads of the associated pair (For Example: See Figure 2).

In regards to claim 8, Lakritz fails to disclose the following:

a) solder masses consist essentially of a lead-tin solder with between about 1% and about 5% copper, and wherein said columnar inclusions constitute a copper-rich phase within said solder masses.

However, Tanaka discloses the use of a solder mass that consists of lead tin solder and copper (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Lakritz to include a solder mass that consist of lead tin solder and copper as disclosed in Tanaka because it aids in improving the tensile strength (For Example: See Abstract).

Additionally, since Lakritz and Tanaka are both from the same field of endeavor, the purpose disclosed by Tanaka would have been recognized in the pertinent art of Lakritz.

7. Claim 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakritz et al. (U.S. Patent No. 4,545,610) in view of Tanaka (Japanese Publication No. 02295699) and Garner (U.S. Patent No. 4,581,680).

In regards to claim 6, Lakritz discloses the following:

a) the pads of each said pair are spaced apart from one another in a vertical direction normal to the confronting surfaces and offset from one another in a horizontal direction parallel to the confronting surfaces (For Example: See Figure 2);

In regards to claim 6, Lakritz fails to disclose the following:

a) elongated solder masses extend oblique to said vertical and horizontal directions.

However, Garner discloses solder masses extended in an oblique direction (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Lakritz to include solder masses extended in an oblique direction as disclosed in Garner because it aids in reducing stress on the pads (For Example: See Column 1 Lines 38-48).

Additionally, since Lakritz and Garner are both from the same field of endeavor, the purpose disclosed by Garner would have been recognized in the pertinent art of Lakritz.

In regards to claim 7, Lakritz fails to disclose the following:

a) solder masses consist essentially of a lead-tin solder with between about 1% and about 5% copper, and wherein said columnar inclusions constitute a copper-rich phase within said solder masses.

However, Tanaka discloses the use of a solder mass that consists of lead tin solder and copper (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Lakritz to include a solder mass that has a solder mass that consist of lead tin solder and copper as disclosed in Tanaka because it aids in improving the tensile strength (For Example: See Abstract).

Additionally, since Lakritz and Tanaka are both from the same field of endeavor, the purpose disclosed by Tanaka would have been recognized in the pertinent art of Lakritz.

Additionally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are

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disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235.

### ***Conclusion***

8. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Griffin IV et al. (U.S. Patent No. 5,950,073) discloses a semiconductor package; b) Carey et al. (U.S. Patent No. 5,597,469) discloses a process for selective application of solder; c) Brofman et al. (U.S. Patent No. 5,968,670) discloses a ball grid array package; d) Li (U.S. Patent No. 6,286,206) discloses a heat resistant system; d) Paul et al. (German Publication No. 003736671C1) discloses a method of producing a semiconductor; e) Marshall et al. *Composite Solders*; and f) Marshall et al. *Hard-Particle Reinforced Composite Solders*.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 703-305-3743. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML  
September 5, 2003

  
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